

WHAT IS CLAIMED IS:

1 1. A computer-implemented method of generating a printable
2 representation for an electronically stored multimedia document storing multimedia
3 information, the multimedia information comprising information of at least a first type and
4 information of a second type, the method comprising:

5 accessing layout information specifying how the multimedia information
6 stored by the multimedia document is to be printed on a paper medium; and

7 generating the printable representation for the multimedia information stored
8 in the multimedia document based upon the layout information, the printable representation
9 for the multimedia document comprising a printable representation for information of the first
10 type and a printable representation for information of the second type, the printable
11 representation of the multimedia document capable of being printed on a paper medium.

1 2. The method of claim 1 wherein generating the printable representation
2 for the multimedia information stored in the multimedia document comprises:

3 dividing the multimedia information stored in the multimedia document into a
4 plurality of segments, each segment comprising multimedia information of a pre-configured
5 time length;

6 from the plurality of segments, selecting a set of segments to be included in
7 the printable representation for the multimedia document, the set of segments including one
8 or more segments from the plurality of segments; and

9 generating the printable representation for the multimedia document based
10 upon the layout information and multimedia information corresponding to the selected set of
11 segments.

1 3. The method of claim 2 wherein selecting the set of segments to be
2 included in the printable representation comprises:

3 identifying a selection criterion; and

4 selecting a segment from the plurality of segments to be included in the set of
5 segments if the multimedia information corresponding to the segment satisfies the selection
6 criterion.

1 4. The method of claim 3 wherein:

2 the selection criterion comprises a topic of interest to a user; and

3 selecting a segment from the plurality of segments to be included in the set of
4 segments comprises selecting the segment if the multimedia information corresponding to the
5 segment comprises information relevant to the topic of interest.

1 5. The method of claim 2 wherein generating the printable representation
2 for the multimedia document based upon the layout information and multimedia information
3 corresponding to the selected set of segments comprises:

4 determining a set of pages on which the multimedia information
5 corresponding to the selected set of segments is to be printed, the set of pages comprising one
6 or more pages; and

7 creating printable representations for the set of pages, wherein the printable
8 representation for each page includes the printable representation for information of the first
9 type and the printable representation for information of the second type corresponding to
10 segments to be printed on the page.

1 6. The method of claim 5 wherein the printable representation for each
2 page in the set of pages includes information identifying one or more segments from the set
3 of segments whose information is included in the printable representation for the page.

1 7. The method of claim 1 wherein:
2 the information of the first type corresponds to video information; and
3 the printable representation for information of the first type comprises video
4 keyframes selected from the video information.

1 8. The method of claim 7 wherein:
2 the information of the second type corresponds to closed-caption text
3 information; and
4 the printable representation for information of the second type comprises text
5 information selected from the closed-caption text information.

1 9. The method of claim 7 wherein:
2 the information of the second type corresponds to audio information; and
3 the printable representation for information of the second type comprises text
4 information selected from a text transcript of the audio information.

1 10. The method of claim 1 wherein the multimedia information stored by
2 the multimedia document includes information of a third type and information of a fourth
3 type and the printable representation for the multimedia document comprises a printable
4 representation for information of the third type and a printable representation for information
5 of the fourth type, wherein the information of the first type corresponds to video information,
6 the information of the second type corresponds to closed-caption text information,
7 information of the third type corresponds to slides information, and information of the fourth
8 type corresponds to whiteboard information.

1 11. The method of claim 1 further comprising:
2 printing the printable representation for the multimedia document on a paper
3 medium to generate a multimedia paper document comprising one or more printed pages.

1 12. The method of claim 11 wherein:
2 a time span is associated with at least one page of the multimedia paper
3 document, the time span characterized by a first time and a second time; and
4 the at least one page of the multimedia paper document is imprinted with a
5 portion of the printable representation for the multimedia document corresponding to
6 multimedia information occurring between the first time and the second time associated with
7 the at least one page.

1 13. The method of claim 12 wherein:
2 the first time and the second time associated with the at least one page of the
3 one or more pages is printed on the at least one page.

1 14. The method of claim 12 wherein:
2 a portion of the printable representation for information of the first type
3 corresponding to the time span associated with the at least one page is printed on a first
4 section of the at least one page, and a portion of the printable representation for information
5 of the second type corresponding to the time span associated with the at least one page is
6 printed on a second section of the at least one page.

1 15. The method of claim 14 wherein the at least one page of the one or
2 more printed pages is imprinted with identifiers for temporally correlating the printable

3 representation for information of the first type printed on the page with the printable
4 representation for information of the second type printed on the at least one page.

1 16. The method of claim 14 wherein:
2 the information of the first type corresponds to video information; and
3 the portion of the printable representation for information of the first type
4 printed on the at least one page of the multimedia paper document comprises video
5 keyframes selected from the video information occurring in the multimedia information
6 stored by the multimedia document during the time span associated with the at least one page.

1 17. The method of claim 16 wherein:
2 the information of the second type corresponds to closed-caption text
3 information; and
4 the portion of the printable representation for information of the second type
5 printed on the at least one page comprises text information selected from the closed-caption
6 text information occurring in the multimedia information stored by the multimedia document
7 during the time span associated with the at least one page.

1 18. The method of claim 16 wherein:
2 the information of the second type corresponds to audio information; and
3 the portion of the printable representation for information of the second type
4 printed on the at least one page comprises text information selected from a transcript of the
5 audio information occurring in the multimedia information stored by the multimedia
6 document during the time span associated with the at least one page.

1 19. The method of claim 11 wherein information imprinted on at least one
2 page of the multimedia paper document includes information identifying the multimedia
3 document, information identifying a time length of the multimedia document, and
4 information identifying a time when the multimedia information in the multimedia document
5 was recorded.

1 20. The method of claim 11 wherein:
2 the multimedia information stored by the multimedia document includes
3 information of a third type and information of a fourth type; and
4 at least one page of the multimedia paper document is imprinted with a portion
5 of the printable representation for the multimedia document corresponding to a time span

6 associated with the at least one page, the time span characterized by a first time and a second
7 time, the portion of the printable representation for the multimedia document imprinted on
8 the at least one page comprising a portion of the printable representation for information of
9 the first type corresponding to the time span associated with the at least one page, a portion of
10 the printable representation for information of the second type corresponding to the time span
11 associated with the at least one page, a portion of the printable representation for information
12 of the third type corresponding to the time span associated with the at least one page, and a
13 portion of the printable representation for information of the fourth type corresponding to the
14 time span associated with the at least one page; and

15 the information of the first type corresponds to video information, the
16 information of the second type corresponds to closed-caption text information, the
17 information of the third type corresponds to slides information, and the information of the
18 fourth type corresponds to whiteboard information.

1 21. A computer-implemented method of generating a paper document for a
2 electronically stored multimedia document, the multimedia document storing multimedia
3 information that includes video information, the method comprising:

4 printing one or more video keyframes in a first area of a page of the paper
5 document, wherein the one or more video keyframes are extracted from the video information
6 occurring during a time span associated with the page, the time span characterized by a first
7 time and a second time; and

8 printing text information in a second area of the page of the paper document,
9 wherein the text information printed in the second area is extracted from the multimedia
10 information occurring during the time span associated with the page.

4 printing one or more slides from the plurality of slides on the page of the paper
5 document, wherein the one or more slides printed on the page include slides having a time
6 stamp occurring during the time span associated with the page.

1 24. The method of claim 21 wherein the multimedia information stored by
2 the multimedia document includes information identifying a plurality of whiteboard images,
3 the method further comprising:

4 printing one or more whiteboard images from the plurality of whiteboard
5 images on the page of the paper document, wherein the one or more whiteboard images
6 printed on the page include images having a time stamp occurring during the time span
7 associated with the page.

1 25. The method of claim 21 further comprising:

2 printing information identifying the multimedia document on the page of the
3 paper document;

4 printing information identifying a time length of the multimedia document on
5 the page; and

6 printing information identifying a time when the multimedia information
7 stored by the multimedia document was recorded on the page.

1 26. The method of claim 21 further comprising:

2 printing a first identifier on the page of the paper document in a location
3 proximal to a first video frame printed on the page; and

4 printing the same first identifier on the page in a location proximal to text
5 information printed on the page that occurs substantially at the same time in the multimedia
6 document as the first video frame.

1 27. The method of claim 21 wherein:

2 the multimedia information stored by the multimedia document includes
3 closed-caption text information; and

4 the text information printed in the second area of the page of the paper
5 document is extracted from the closed-caption text information occurring during the time
6 span associated with the page.

1 28. The method of claim 27 further comprising:

2 determining a time period during the time span associated with the page of the
3 paper document when the closed-caption information is empty;

4 determining a video feature from the video information occurring during the
5 time period; and

6 printing text identifying the video feature on the page.

1 29. The method of claim 27 wherein the multimedia information stored by
2 the multimedia document includes audio information and the method further comprises:

3 determining a time period during the time span associated with the page when
4 the closed-caption information is empty;

5 determining an audio feature from the audio information occurring during the
6 time period; and

7 printing text identifying the audio feature on the page.

1 30. The method of claim 21 wherein:

2 the multimedia information stored by the multimedia document includes audio
3 information; and

4 the text information printed in the second area of the page of the paper
5 document is extracted from a transcript of the audio information occurring during the time
6 span associated with the page.

1 31. A paper document which comprises:

2 one or more pages, wherein at least one page of the one or more pages is
3 imprinted with text information and one or more video frames extracted from multimedia
4 information between a first time and a second time, the multimedia information stored
5 electronically in a multimedia document.

1 32. The paper document recited in claim 31, wherein the text information
2 is extracted from closed-caption text information included in the multimedia information
3 stored by the multimedia document.

1 33. The paper document recited in claim 31, wherein the text information
2 is extracted from audio information included in the multimedia information stored by the
3 multimedia document.

1 34. The paper document recited in claim 31, wherein the one or more
2 video frames are extracted from video information included in the multimedia information
3 stored by the multimedia document.

1 35. The paper document recited in claim 31, wherein at least one page of
2 the one or more pages is imprinted with an image of a slide extracted from the multimedia
3 information.

1 36. The paper document recited in claim 31, wherein at least one page of
2 the one or more pages is imprinted with a whiteboard image extracted from the multimedia
3 information.

1 37. A system for generating a printable representation for an electronically
2 stored multimedia document storing multimedia information, the multimedia information
3 comprising information of at least a first type and information of a second type, the system
4 comprising:

5 a data processor, configured to:

6 access layout information specifying how the multimedia information
7 stored by the multimedia document is to be printed on a paper medium; and

8 generate the printable representation for the multimedia information
9 stored in the multimedia document based upon the layout information, the printable
10 representation for the multimedia document comprising a printable representation for
11 information of the first type and a printable representation for information of the second type,
12 the printable representation of the multimedia document capable of being printed on a paper
13 medium; and

14 communicate the printable representation of the multimedia document
15 to an output device; and

16 an output device capable of printing the printable representation of the
17 multimedia document on a paper medium.

1 38. The system of claim 37 wherein in order to generate the printable
2 representation for the multimedia information stored in the multimedia document, the data
3 processor is configured to:

4 divide the multimedia information stored in the multimedia document into a
5 plurality of segments, each segment comprising multimedia information of a pre-configured
6 time length;

from the plurality of segments, select a set of segments to be included in the printable representation for the multimedia document, the set of segments comprising one or more segments from the plurality of segments; and

generate the printable representation for the multimedia document based upon the layout information and multimedia information corresponding to the selected set of segments.

39. The system of claim 38 wherein in order to select the set of segments to be included in the printable representation, the data processor is configured to:

receive a selection criterion; and

select a segment from the plurality of segments to be included in the set of segments if the multimedia information corresponding to the segment satisfies the selection criterion.

40. The system of claim 39 wherein:

the selection criterion comprises a topic of interest to a user; and

in order to select a segment from the plurality of segments to be included in the set of segments, the data processor is configured to select the segment if the multimedia information corresponding to the segment comprises information relevant to the topic of interest.

41. The system of claim 38 wherein in order to generate the printable

representation for the multimedia document based upon the layout information and multimedia information corresponding to the selected set of segments, the data processor is configured to:

determine a set of pages on which the multimedia information corresponding set of segments is to be printed, the set of pages comprising one or more

8 create printable representations for the set of pages, wherein the printable
9 representation for each page includes the printable representation for information of the first
10 type and the printable representation for information of the second type corresponding to
11 segments to be printed on the page.

1 42. The system of claim 41 wherein the printable representation for each
2 page in the set of pages includes information identifying one or more segments from the set
3 of segments whose information is included in the printable representation for the page.

1 43. The system of claim 37 wherein:
2 the information of the first type corresponds to video information; and
3 the printable representation for information of the first type comprises video
4 keyframes selected from the video information.

1 44. The system of claim 43 wherein:
2 the information of the second type corresponds to closed-caption text
3 information; and
4 the printable representation for information of the second type comprises text
5 information selected from the closed-caption text information.

1 45. The system of claim 43 wherein:
2 the information of the second type corresponds to audio information; and
3 the printable representation for information of the second type comprises text
4 information selected from a text transcript of the audio information.

1 46. The system of claim 37 wherein the multimedia information stored by
2 the multimedia document includes information of a third type and information of a fourth
3 type and the printable representation for the multimedia document comprises a printable
4 representation for information of the third type and a printable representation for information
5 of the fourth type, wherein the information of the first type corresponds to video information,
6 the information of the second type corresponds to closed-caption text information,
7 information of the third type corresponds to slides information, and information of the fourth
8 type corresponds to whiteboard information.

1 47. The system of claim 37 wherein the output device is configured to
2 print the printable representation for the multimedia document on a paper medium to generate
3 a multimedia paper document comprising one or more printed pages.

1 48. The system of claim 47 wherein:

2 a time span is associated with at least one page of the multimedia paper
3 document, the time span characterized by a first time and a second time; and
4 the at least one page of the multimedia paper document is imprinted with a
5 portion of the printable representation for the multimedia document corresponding to
6 multimedia information occurring between the first time and the second time associated with
7 the at least one page.

1 49. The system of claim 48 wherein:
2 the first time and the second time associated with the at least one page are
3 printed on the at least one page.

1 50. The system of claim 48 wherein:
2 a portion of the printable representation for information of the first type
3 corresponding to the time span associated with the at least one page is printed on a first
4 section of the at least one page, and a portion of the printable representation for information
5 of the second type corresponding to the time span associated with the at least one page is
6 printed on a second section of the at least one page.

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1 51. The system of claim 50 wherein the at least one page is imprinted with
2 identifiers for temporally correlating the printable representation for information of the first
3 type printed on the at least one page with the printable representation for information of the
4 second type printed on the at least one page.

1 52. The system of claim 50 wherein:
2 the information of the first type corresponds to video information; and
3 the portion of the printable representation for information of the first type
4 printed on the at least one page of the multimedia paper document comprises video
5 keyframes selected from the video information occurring in the multimedia information
6 stored by the multimedia document during the time span associated with the at least one page.

1 53. The system of claim 52 wherein:
2 the information of the second type corresponds to closed-caption text
3 information; and
4 the portion of the printable representation for information of the second type
5 printed on the at least one page comprises text information selected from the closed-caption

6 text information occurring in the multimedia information stored by the multimedia document
7 during the time span associated with the at least one page.

1 54. The system of claim 52 wherein:
2 the information of the second type corresponds to audio information; and
3 the portion of the printable representation for information of the second type
4 printed on the at least one page comprises text information selected from a transcript of the
5 audio information occurring in the multimedia information stored by the multimedia
6 document during the time span associated with the at least one page.

1 55. The system of claim 47 wherein information imprinted on at least one
2 page of the multimedia paper document includes information identifying the multimedia
3 document, information identifying a time length of the multimedia document, and
4 information identifying a time when the multimedia information in the multimedia document
5 was recorded.

1 56. The system of claim 47 wherein:
2 the multimedia information stored by the multimedia document includes
3 information of a third type and information of a fourth type; and
4 at least one page of the multimedia paper document is imprinted with a portion
5 of the printable representation for the multimedia document corresponding to a time span
6 associated with the at least one page, the time span characterized by a first time and a second
7 time, the portion of the printable representation for the multimedia document imprinted on
8 the at least one page comprising a portion of the printable representation for information of
9 the first type corresponding to the time span associated with the at least one page, a portion of
10 the printable representation for information of the second type corresponding to the time span
11 associated with the at least one page, a portion of the printable representation for information
12 of the third type corresponding to the time span associated with the at least one page, and a
13 portion of the printable representation for information of the fourth type corresponding to the
14 time span associated with the at least one page; and
15 the information of the first type corresponds to video information, the
16 information of the second type corresponds to closed-caption text information, the
17 information of the third type corresponds to slides information, and the information of the
18 fourth type corresponds to whiteboard information.

1 57. A system for generating a printed page, the system comprising:
2 an input module, configured to receive a printable representation of
3 multimedia information stored by a multimedia document, the printable representation
4 including one or more video keyframes extracted from the multimedia information occurring
5 during a time span characterized by a first time and a second time, the printable
6 representation including text information extracted from the multimedia information
7 occurring during the time span; and

8 an output module, configured to:
9 print the one or more video keyframes in a first area of a page; and
10 print the text information in a second area of the page.

11 58. The system of claim 57 wherein the output module is configured to
12 print the first time and the second time of the time span on the page.

13 59. The system of claim 57 wherein:
14 the printable representation received by the input module includes one or more
15 slides extracted from multimedia information occurring during the time span; and
16 the output module is configured to print the one or more slides on the page.

17 60. The system of claim 57 wherein:
18 the printable representation received by the input module includes one or more
19 whiteboard images extracted from multimedia information occurring during the time span;
20 and
21 the output module is configured to print the one or more whiteboard images on
22 the page.

23 61. The system of claim 57 wherein the output module is configured to:
24 print information identifying the multimedia document on the page;
25 print information identifying a time length of the multimedia document on the
26 page; and
27 print information identifying a time when the multimedia information stored
28 by the multimedia document was recorded on the page.

29 62. The system of claim 57 wherein the output module is configured to:

2 print a first identifier on the page in a location proximal to a first video frame
3 printed on the page; and

4 print the same first identifier on the page in a location proximal to text
5 information printed on the page that occurs substantially at the same time in the multimedia
6 information as the first video frame.

1 64. The system of claim 63 wherein:

2 the printable representation received by the input module includes text related
3 to a video feature extracted from video information included in the multimedia information
4 during the time span when the closed-caption text information is empty; and
5 the output module is configured to print the text related to the video feature on
6 the page.

1 65. The system of claim 63 wherein:

the printable representation received by the input module includes text related to an audio feature extracted from audio information included in the multimedia information during the time span when the closed-caption text information is empty; and

the output module is configured to print the text related to the audio feature on the page.

1 66. The system of claim 57 wherein the text information printed in the
2 second area of the page by the output module is extracted from a transcript of audio
3 information included in the multimedia information and occurring during the time span.

1 67. A computer program product stored on a computer-readable storage
2 medium for generating a printable representation for an electronically stored multimedia
3 document storing multimedia information, the multimedia information comprising
4 information of at least a first type and information of a second type, the computer program
5 product comprising:

6 code for accessing layout information specifying how the multimedia
7 information stored by the multimedia document is to be printed on a paper medium; and

8 code for generating the printable representation for the multimedia
9 information stored in the multimedia document based upon the layout information, the
10 printable representation for the multimedia document comprising a printable representation
11 for information of the first type and a printable representation for information of the second
12 type, the printable representation of the multimedia document capable of being printed on a
13 paper medium.

1 68. The computer program product of claim 67 wherein the code for
2 generating the printable representation for the multimedia information stored in the
3 multimedia document comprises:

4 code for dividing the multimedia information stored in the multimedia
5 document into a plurality of segments, each segment comprising multimedia information of a
6 pre-configured time length;

code for selecting a set of segments from the plurality of segments to be included in the printable representation for the multimedia document, the set of segments including one or more segments from the plurality of segments; and

10 code for generating the printable representation for the multimedia document
11 based upon the layout information and multimedia information corresponding to the selected
12 set of segments.

1 69. The computer program product of claim 67 wherein:
2 the information of the first type corresponds to video information; and
3 the printable representation for information of the first type comprises video
4 keyframes selected from the video information.

1 70. The computer program product of claim 69 wherein:
2 the information of the second type corresponds to closed-caption text
3 information; and
4 the printable representation for information of the second type comprises text
5 information selected from the closed-caption text information.

1 71. The computer program product of claim 69 wherein:
2 the information of the second type corresponds to audio information; and
3 the printable representation for information of the second type comprises text
4 information selected from a text transcript of the audio information.

1 72. The computer program product of claim 67 further comprising:
2 code for printing the printable representation for the multimedia document on
3 a paper medium to generate a multimedia paper document comprising one or more printed
4 pages.

1 73. The computer program product of claim 72 wherein:
2 a time span is associated with at least one page of the multimedia paper
3 document, the time span characterized by a first time and a second time; and
4 the at least one page of the multimedia paper document is imprinted with a
5 portion of the printable representation for the multimedia document corresponding to
6 multimedia information occurring between the first time and the second time associated with
7 the at least one page.

1 74. A computer program product stored on a computer-readable storage
2 medium for generating a paper document for a electronically stored multimedia document,
3 the multimedia document storing multimedia information that includes video information, the
4 computer program product comprising:

5 code for printing one or more video keyframes in a first area of a page of the
6 paper document, wherein the one or more video keyframes are extracted from the video
7 information occurring during a time span associated with the page, the time span
8 characterized by a first time and a second time; and

9 code for printing text information in a second area of the page of the paper
10 document, wherein the text information printed in the second area is extracted from the
11 multimedia information occurring during the time span associated with the page.

1 75. The computer program product of claim 74 wherein the multimedia
2 information stored by the multimedia document includes information identifying a plurality
3 of slides, the computer program product further comprising:

4 code for printing one or more slides from the plurality of slides on the page of
5 the paper document, wherein the one or more slides printed on the page include slides having
6 a time stamp occurring during the time span associated with the page.

1 76. The computer program product of claim 74 wherein the multimedia
2 information stored by the multimedia document includes information identifying a plurality
3 of whiteboard images, the computer program product further comprising:

4 code for printing one or more whiteboard images from the plurality of
5 whiteboard images on the page of the paper document, wherein the one or more whiteboard
6 images printed on the page include images having a time stamp occurring during the time
7 span associated with the page.

1 77. The computer program product of claim 74 wherein:
2 the multimedia information stored by the multimedia document includes
3 closed-caption text information; and
4 the text information printed in the second area of the page of the paper
5 document is extracted from the closed-caption text information occurring during the time
6 span associated with the page.

7 78. The computer program product of claim 74 wherein:
8 the multimedia information stored by the multimedia document includes audio
9 information; and
10 the text information printed in the second area of the page of the paper
11 document is extracted from a transcript of the audio information occurring during the time
12 span associated with the page.